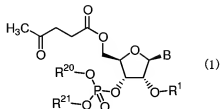


CLAIMS

[Claim 1] A ribonucleic acid compound represented by the following general formula (1):

[Chemical Formula 19]



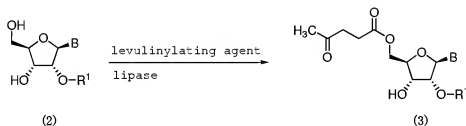
5 (wherein B represents adenine, guanine, cytosine or uracil or a modified form thereof; R¹ represents a protecting group which can be removed at 90% or more at a temperature in the range from 0°C to 60°C under acidic conditions at a pH value from 2 to 4 within 24 hours; R²⁰ represents H or
10 an alkyl which may be substituted; and R²¹ represents an aryl which may be substituted or a monocyclic or bicyclic heterocyclic which may be substituted), or a salt thereof.
[Claim 2] The ribonucleic acid compound or a salt thereof
15 according to claim 1, wherein R¹ is 2-tetrahydrofuranyl or 1,3-dioxolan-2-yl.

[Claim 3] The ribonucleic acid compound or a salt thereof according to claim 1 or 2, wherein R²⁰ is H, 2-cyanoethyl or 2,2,2-trichloroethyl, and R²¹ is 2-chlorophenyl or 2-chloro-4-tert-butylphenyl.
20

[Claim 4] A method for producing a ribonucleic acid compound represented by the following general formula (3),

comprising regioselectively levulinylating the hydroxyl at the 5'-position by allowing a levulinylating agent and a lipase to act on a ribonucleic acid compound represented by the following general formula (2):

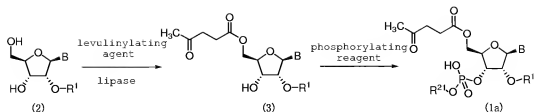
5 [Chemical Formula 20]



(wherein B represents adenine, guanine, cytosine or uracil or a modified form thereof; and R¹ represents a protecting group which can be removed at 90% or more at a temperature
10 in the range from 0°C to 60°C under acidic conditions at a pH value from 2 to 4 within 24 hours).

[Claim 5] A method for producing a ribonucleic acid compound (1) in which R²⁰ is H represented by the following general formula (1a) by allowing a phosphorylating reagent
15 to act on a ribonucleic acid compound represented by the following general formula (3) produced by a production method including the step of regioselectively levulinylating the hydroxyl at the 5'-position by allowing a levulinylating agent and a lipase to act on a
20 ribonucleic acid compound represented by the following general formula (2):

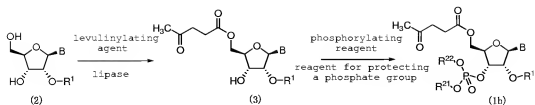
[Chemical Formula 21]



(wherein B represents adenine, guanine, cytosine or uracil or a modified form thereof; R¹ represents a protecting group which can be removed at 90% or more at a temperature in the range from 0°C to 60°C under acidic conditions at a pH value from 2 to 4 within 24 hours; and R²¹ represents an aryl which may be substituted or a monocyclic or bicyclic heterocyclic which may be substituted).

[Claim 6] A method for producing a ribonucleic acid compound (1) in which R²⁰ is an alkyl which may be substituted represented by the following general formula (1b) by allowing a phosphorylating reagent and a reagent for protecting a phosphate group to act on a ribonucleic acid compound represented by the following general formula (3) produced by a production method including the step of regioselectively levulinylating the hydroxyl at the 5'-position by allowing a levulinylating agent and a lipase to act on a ribonucleic acid compound represented by the following general formula (2):

[Chemical Formula 22]



(wherein B represents adenine, guanine, cytosine or uracil or a modified form thereof; R¹ represents a protecting group which can be removed at 90% or more at a temperature in the range from 0°C to 60°C under acidic conditions at a pH value from 2 to 4 within 24 hours; R²¹ represents an aryl which may be substituted or a monocyclic or bicyclic heterocyclic which may be substituted; and R²² represents an alkyl which may be substituted).

[Claim 7] The method for producing a ribonucleic acid compound according to any one of claims 4 to 6, wherein R¹ is 2-tetrahydrofuranyl-2-yl.

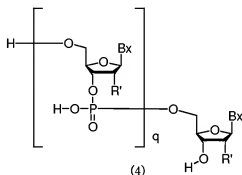
[Claim 8] The method for producing a ribonucleic acid compound according to any one of claims 4 to 7, wherein the levulinylating agent is levulinic acid, levulinic anhydride, a levulinate ester or a halide levulinate.

[Claim 9] The method for producing a ribonucleic acid compound according to any one of claims 5 to 8, wherein the phosphorylating reagent is 2-chlorophenyl phosphoroditriazolidide, 2-chlorophenyl-O,O-bis(1-benzotriazolyl)phosphate or 2-chloro-4-tert-butylphenyl phosphoroditriazolidide.

[Claim 10] The method for producing a ribonucleic acid compound according to any one of claims 6 to 9, wherein the reagent for protecting a phosphate group is 3-hydroxypropionitril or 2,2,2-trichloroethanol.

- 5 [Claim 11] A liquid-phase synthesis method for an oligonucleotide compound represented by the following general formula (4):

[Chemical Formula 23]

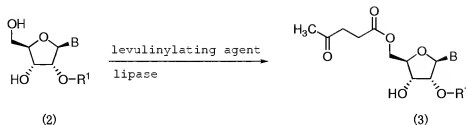


- 10 (wherein each Bx independently represents adenine, guanine, cytosine, uracil or thymine or a modified form thereof; q represents an integer in the range from 1 to 100; at least one of R' is hydroxyl and the others represent independently H or hydroxyl), comprising the following
- 15 steps (a) to (f):

- (a) producing a ribonucleic acid compound represented by the following general formula (3) by regioselectively levulinylating the hydroxyl at the 5'-position by allowing a levulinylating agent and a lipase
- 20 to act on a ribonucleic acid compound represented by the

following general formula (2):

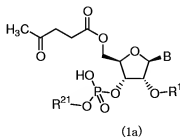
[Chemical Formula 24]



(wherein B represents adenine, guanine, cytosine or uracil
 5 or a modified form thereof; and R¹ represents a protecting
 group which can be removed at 90% or more at a temperature
 in the range from 0°C to 60°C under acidic conditions at a
 pH value from 2 to 4 within 24 hours);

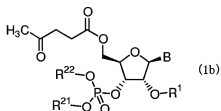
(b) producing a ribonucleic acid compound
 10 represented by the following general formula (1a) by
 phosphorylating the hydroxyl at the 3'-position by
 allowing a phosphorylating reagent to act on a ribonucleic
 acid compound (3) produced by the step (a):

[Chemical Formula 25]

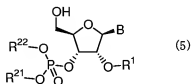


(wherein B and R¹ are the same as defined above; and R²¹
 represents aryl which may be substituted or a monocyclic
 or bicyclic heterocyclic group which may be substituted);

(c) producing, separately from the step (b), a ribonucleic acid compound represented by the following general formula (1b) by allowing a phosphorylating reagent and a reagent for protecting a phosphate group to act on a
 5 ribonucleic acid compound (3) produced by the step (a):
 [Chemical Formula 26]



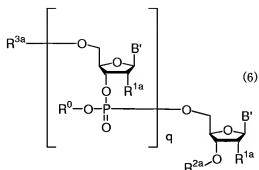
(wherein B, R¹ and R²¹ are the same as defined above; and R²² represents alkyl which may be substituted);
 10 (d) producing a ribonucleic acid compound represented by the following general formula (5) by deprotecting levulinyl of the ribonucleic acid compound (1b) produced by the step (c):
 [Chemical Formula 27]



(wherein B, R¹, R²¹ and R²² are the same as defined above);
 (e) producing an oligonucleotide compound represented by the following general formula (6) by stepwise oligomerization using as a monomer component, at
 20 least one of the ribonucleic acid compounds (1a) and (5)

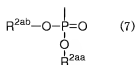
produced by the steps (b) and (d), respectively:

[Chemical Formula 28]



(wherein each B' independently represents adenine, guanine,
 5 cytosine, uracil or thymine or a modified form thereof;
 each R⁰ independently represents H, aryl which may be
 substituted or a monocyclic or bicyclic heterocyclic group
 which may be substituted; R^{3a} represents H, levulinyl or
 4,4'-dimethoxytrityl; q is the same as defined above; at
 10 least one of R^{1a} is hydroxyl substituted with a protecting
 group which can be removed at 90% or more at a temperature
 in the range from 0°C to 60°C under acidic conditions at a
 pH value from 2 to 4 within 24 hours, and the others
 independently represent H or hydroxyl substituted with a
 15 protecting group which can be removed at 90% or more at a
 temperature in the range from 0°C to 60°C under acidic
 conditions at a pH value from 2 to 4 within 24 hours; and
 R^{2a} represents acyl or a phosphate group represented by the
 following general formula (7):

20 [Chemical Formula 29]



(wherein R^{2aa} represents aryl which may be substituted or a monocyclic or bicyclic heterocyclic group which may be substituted; and R^{2ab} represents H or alkyl which may be substituted); and

(f) deprotecting all the protecting groups of the oligonucleotide compound (6) produced by the step (e).

[Claim 12] The liquid-phase synthesis method for an oligonucleotide compound according to claim 11, wherein R^1 is 2-tetrahydrofuranyl or 1,3-dioxolan-2-yl.

[Claim 13] The liquid-phase synthesis method for an oligonucleotide compound according to claim 11 or 12, wherein q is an integer in the range from 1 to 100.

[Claim 14] The liquid-phase synthesis method for an oligonucleotide compound according to any one of claims 11 to 13, wherein q is an integer in the range from 10 to 50.

[Claim 15] The liquid-phase synthesis method for an oligonucleotide compound according to any one of claims 11 to 14, wherein the levulinylating agent is levulinic acid, levulinic anhydride, a levulinate ester or a halide levulinate.

[Claim 16] The liquid-phase synthesis method for an oligonucleotide compound according to any one of claims 11 to 15, wherein the phosphorylating reagent is 2-

chlorophenyl phosphoroditriazolide, 2-chlorophenyl-O,O-bis(1-benzotriazolyl)phosphate or 2-chloro-4-tert-butylphenyl phosphoroditriazolide.

[Claim 17] The liquid-phase synthesis method for an
5 oligonucleotide compound according to any one of claims 11 to 16, wherein the reagent for protecting a phosphate group is 3-hydroxypropionitril or 2,2,2-trichloroethanol.